

Disimpaction

- Indicated when a hard fecal mass is identified in the rectum
- Improves the response to maintenance treatment
- RCT: high-dose (1–1.5 g/kg/day) oral polyethylene glycol (PEG) and sodium docusate enema for 6 consecutive days - no difference in efficacy between both treatments
- High-dose PEG is associated with a higher frequency of fecal incontinence during treatment
- ESPGHAN/NASPGHAN guideline recommends the use of PEG as a first choice

PHN Algorithm: disimpaction for patients > 1 years old

Disimpaction at Home

Goal: substantial stool output

ORAL:

- Polyethylene Glycol 3g/kg/day x 2 days

PLUS

- Senna (Ex-lax chocolate chew) $\frac{1}{4}$ - 1 square daily x 2 days
 - If insufficient stools after day 1, double second day dosage. See action plan dosage chart for guidance.
- Alternative to Ex-lax : Bisacodyl tab/suppository 0.25mg/kg/day up to 10mg daily x 3 days

OR RECTAL:

- Between 2-6 yrs of age : Normal saline or mineral oil enema 60 ml x 1, can repeat if needed.
- >6yrs: Normal saline or mineral oil enema 120 ml x 1, can repeat if needed.
 - (Oral preferred over rectal for patient with functional retention. Rectal tx will aggravate retention behavior.)

PHN Algorithm: maintenance for patients > 1 years old

Long-term maintenance therapy

- ESPGHAN/NASPGHAN: use PEG as a first choice
- If PEG is not available, use lactulose as an alternative osmotic laxative
- continue for at least 2 months and until toilet training is accomplished

Maintenance Regimen

Goal: >2 stool/week, no pain, no soiling

Diet:

- Normal Fiber intake for age
- Normal hydration for age
- Behavioral Tools if Toilet Trained
 - Tracking calendar, toileting schedule
 - Consider "Poo and You" video

Daily Stool Softener:

*See action plan dosage charts

- Polyethylene Glycol 0.4-1.0 g/kg/day OR
- Lactulose 1-3 ml/kg/day OR
- Magnesium Hydroxide 1-3 ml/kg/dy.

Weaning

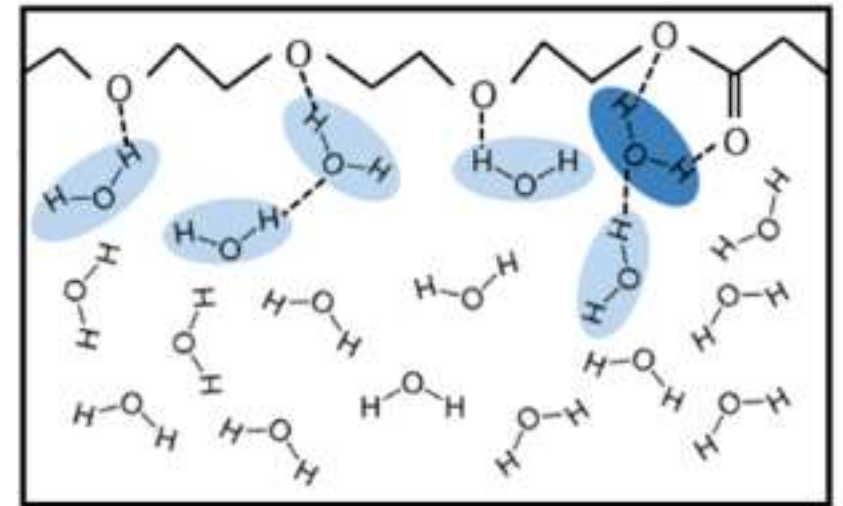
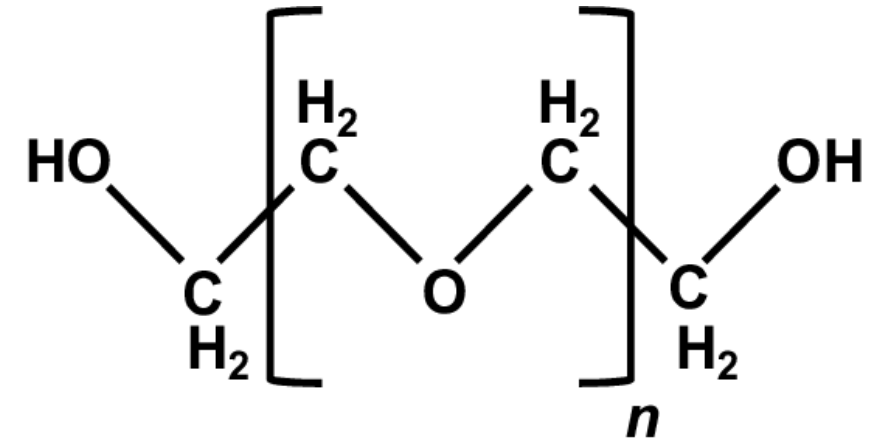
- approximately 50 % on maintenance treatment can be weaned within 6–12 months
- symptoms should be resolved for > 1 month before weaning is initiated
- should be gradually reduced, rather than abruptly discontinued
- symptoms should be evaluated 2 months after cessation of treatment, to prevent or detect relapses

PHN Algorithm: long-term therapy for patients > 1 years old

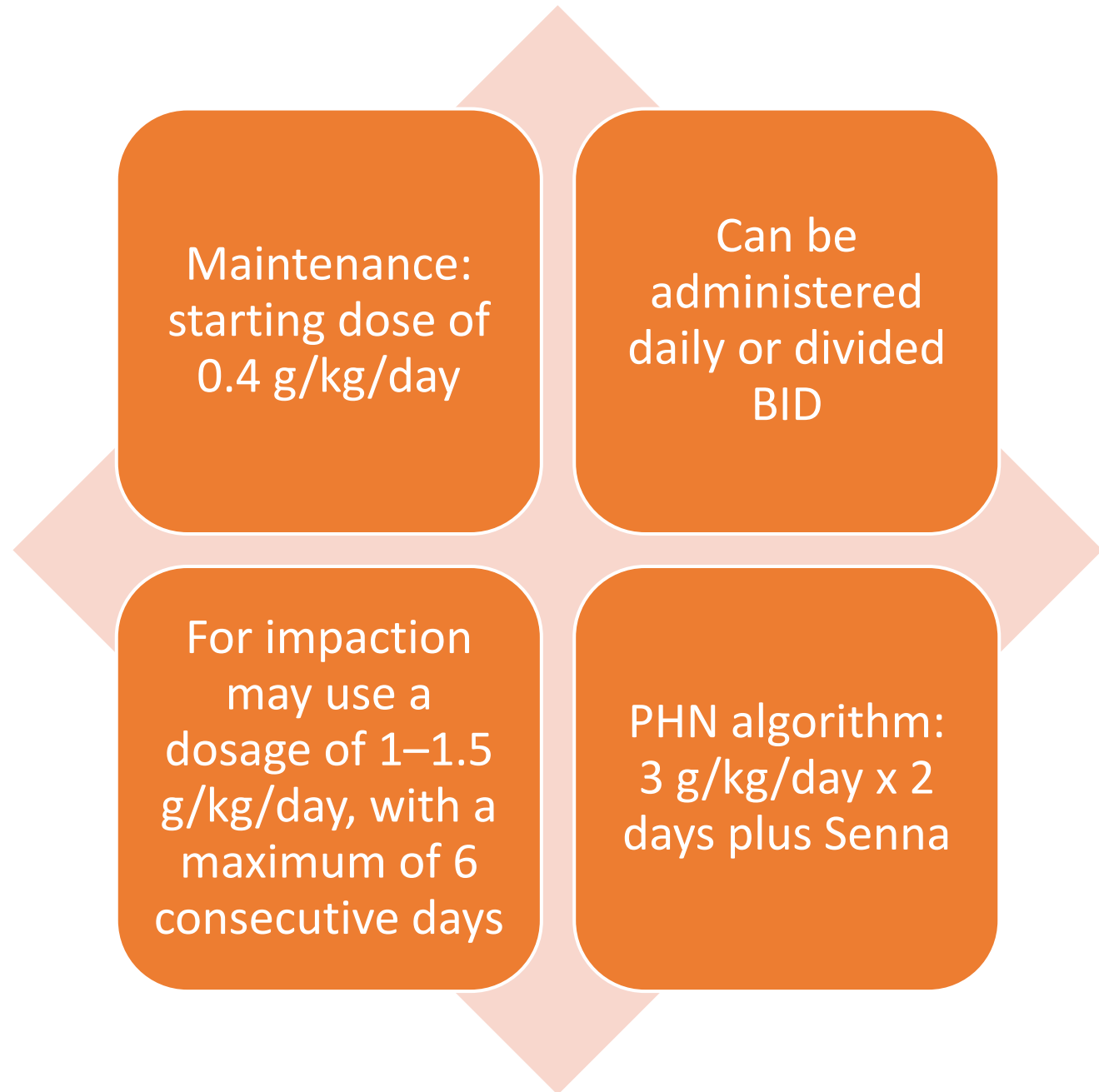
Maintenance Regimen.
Can continue maintenance for up to 1 year before re-evaluation.
Can continue for several years on maintenance.**

Polyethylene glycol (PEG)

- Not metabolized and is minimally (<1 %) absorbed in the intestine
- More effective in increasing stool frequency than placebo, lactulose, and magnesium hydroxide
- Effect seen within 1–2 days; in fecal impaction, this effect might be delayed
- Dosages and frequency should be individualized




PEG dosing



Safety of PEG

The New York Times

Drug for Adults Is Popular as Children's Remedy

 Share full article



 192

By [Catherine Saint Louis](#)

May 25, 2012

- Empire State Consumer Project, a New York consumer group, sent a citizen petition to the F.D.A.
- Reports of tremors, tics, and obsessive-compulsive behavior
- To date, evidence on any relationship between PEG and neuropsychiatric events remains limited to anecdotal reports

Role of Polyethylene Glycol in the Treatment of Functional Constipation in Children

Ilan J N Koppen¹, Ilse J Broekaert, Michael Wilschanski, Alexandra Papadopoulou, Carmen Ribes-Koninckx, Nikhil Thapar, Frederic Gottrand, Rok Orel, Paolo Lionetti, Marc A Benninga

Concerns about laxative addiction

- *“physical or psychological dependence have never been reported for the use of PEG, nor are they expected to occur based on its mechanism of action.”*
- *“abrupt cessation of treatment with PEG can cause a relapse related to the underlying constipation”*
- *“no published adult or pediatric evidence that the effect of PEG will wear off over time”*

Other concerns about PEG



“lazy bowel” or “lazy bowel syndrome” : nonmedical terms referring to a decrease in colonic function as a result of laxative usage



has not been described in the medical literature for patients using PEG



may have been seen in patients with severe functional constipation who have an underlying motility disorder



PEG 3350 Administration Is Not Associated with Sustained Elevation of Glycol Levels

Kent C. Williams, MD > [J Pediatr Gastroenterol Nutr.](#) 2020 Aug;71(2):171-175. doi: 10.1097/MPG.0000000000002786.

Polyethylene Glycol Dosing for Constipation in Children Younger Than 24 Months: A Systematic Review

Helisa Rachel^{1 2}, Andrew F Griffith^{1 2}, Warwick J Teague^{1 2 3}, John M Hutson^{1 3 4},
Susan Gibb^{1 3 5}, Sharon Goldfeld^{1 3 6}, Misel Trajanovska^{1 3 6}, Sebastian K King^{1 2 3 7} 40.

Polyethylene glycol: a game-changer laxative for children

Arik Alper¹, Dinesh S Pashankar

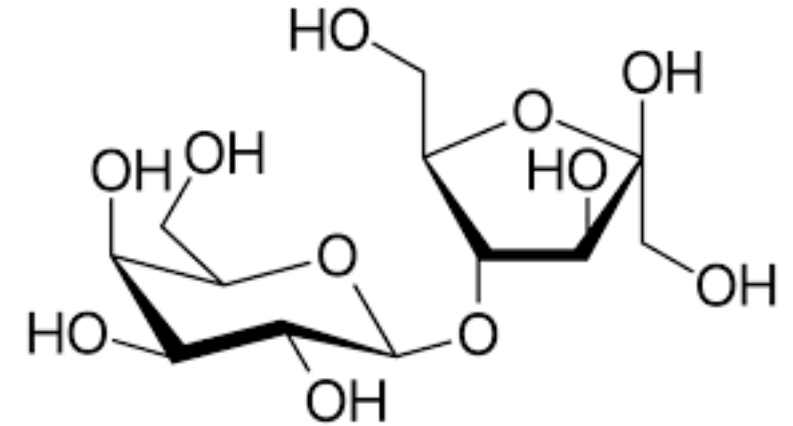
25th anniversary of “Miracle-LAX”



Michelangelo (1508-1512); Vatican Museums

Lactulose

- disaccharide of lactose (C₁₂H₂₂O₁₁)
- fermented into low-molecular-weight acids in the colon by bacteria
- acids cause an osmotic effect, increase of intraluminal fluids
- lower fecal pH stimulates peristalsis
- safe and effective for pts >6 months
- may cause abdominal gas, bloating, and cramping



Dosing: 1-3 ml/kg/day

Magnesium hydroxide (also known as milk of magnesia, MOM)

- hyperosmolar agent causing an osmotic gradient
- Cochrane review : PEG is superior to MOM
- RCT from Mexico (41 vs. 42 children): no difference between PEG and MOM
- Side effects: diarrhea, abdominal pain, and bloating
- **Dosing per NASPGHAN**
 - 2–5 y: 0.4–1.2 g/day, once or divided
 - 6–11 y: 1.2–2.4 g/day, once or divided
 - 12–18 y: 2.4–4.8 g/day, once or divided

Lactulose vs. Milk of Magnesia

Review > [Cochrane Database Syst Rev. 2016 Aug 17;2016\(8\):CD009118.](#)
doi: 10.1002/14651858.CD009118.pub3.

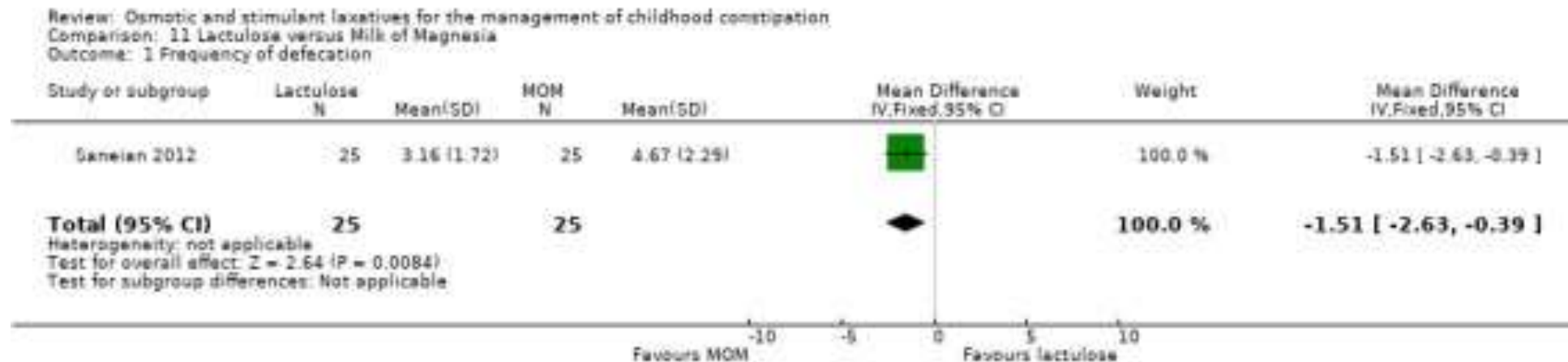
Osmotic and stimulant laxatives for the management of childhood constipation

Morris Gordon ¹, John K MacDonald, Claire E Parker, Anthony K Akobeng, Adrian G Thomas

FULL TEXT LINKS



ACTIONS



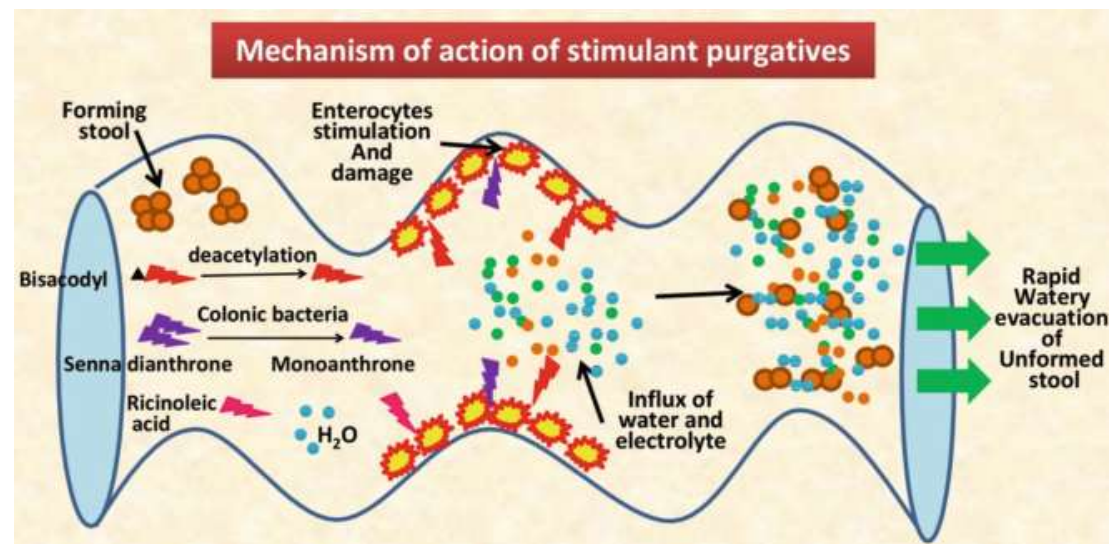
Other magnesium products

- Oral magnesium citrate - used for bowel cleanout prior to colonoscopy
- In one study, 12% of the children were unable to drink the entire dose of magnesium citrate
- little evidence to use as maintenance therapy



Stimulant Laxatives

- enhance colonic peristalsis and secretion by stimulation of the enteric nervous system
 - diphenylmethanes (e.g., bisacodyl and sodium picosulfate)
 - anthraquinones (e.g., senna)
phenolic compounds, metabolized by bacteria
- abdominal cramping is a common side effect



Bisacodyl

- Maintenance therapy (can not be crushed)
 - 3–10 y: 5 mg/day
 - >10 y: 5–10 mg/day
- PHN algorithm: does not include for maintenance.
- retrospective study in 164 children with refractory constipation: bowel movements increased from 2 to 4 per week
- do not administer rectally if proctitis or anal fissures



Senna

- Tablet (8.6, 15, 25 mg) > syrup (8.6 mg/5 ml) > ExLax 15 mg/square
- Dosing:
 - 2–6 y: 2.5–5 mg once or twice/day
 - 6–12 y: 7.5–10 mg/day
 - >12 y: 15–20 mg/day
- Side effects: diarrhea, abdominal pain, nausea, and flatulence and young children are at risk of diaper rash, blisters



Safety of Senna



Are *Senna* based laxatives safe when used as long term treatment for constipation in children?



Alejandra Vilanova-Sanchez *, Alessandra C. Gasior, Nicole Toocheck, Laura Weaver, Richard J Wood, Carlos A. Reck, Andrea Wagner, Erin Hoover, Renae Gagnon, Jordon Jagers, Tassiana Maloof, Onnalisa Nash, Charae Williams, Marc A Levitt

- Review of literature and single center data (640 patients)
- 83 (13%) minor side effects (cramping, vomiting, diarrhea)
- 17 (2%) had blisters
- Advised to reduce stool exposure by changing diapers often
- Adults on long-term senna – melanosis coli, decreased apoptosis
- Retrospective study in adults – higher adenoma rates, no increased cancer

Enemas

- predominantly used for fecal impaction
- different formulations: Sodium docusate, Sodium lauryl sulfoacetate, Sodium phosphate (hyperosmolar phosphate solution), Bisacodyl, Glycerin
- Japanese study: olive oil enemas in combination with glycerin was effective in 80% of children
- Adverse events are mostly minor and include abdominal pain, emesis, and diarrhea

Doses of rectal laxatives

Rectal Laxatives/Enemas

Bisacodyl

2–10 y: 5 mg once per day
>10 y: 5–10 mg once per day

Sodium docusate

<6 y: 60 mL
>6 y: 120 mL

Sodium phosphate

1–18 y: 2.5 mL/kg, maximum 133 mL/dose

Sodium chloride

Neonate <1 kg: 5 mL
Neonate >1 kg: 10 mL
>1 y: 6 mL/kg once or twice per day
2–11 y: 30–60 mL once per day
>11 y: 60–150 mL once per day

Mineral oil

2–11 y: 30–60 mL once per day
>11 y: 60–150 mL once per day

Newer agents

<i>Prosecretory agents</i>		
Lubiprostone	Limited evidence in children; improvement of stool frequency and consistency, and reduced straining and bloating in adults	Nausea
Linacotide	Limited evidence in children; improvement of stool frequency and consistency in adults	Diarrhoea
Plecanatide	Limited evidence in children; improvement of symptoms in adults	Diarrhoea
<i>Serotonergic agents</i>		
Prucalopride	Limited evidence in children; improvement of stool frequency, consistency and straining in adults	Headache, nausea, diarrhoea and abdominal pain

prostaglandin E1 derivative, promotes intestinal fluid secretion by acting on the type 2 chloride channel and promoting intestinal motility

guanylate cyclase C receptor agonist, promoting intestinal fluid secretion

guanylate cyclase C receptor agonist

selective 5-hydroxytryptamine receptor 4 serotonergic agent that increases acetylcholine release and intestinal motility

Biofeedback

Pediatr Drugs 17, 349–360 (2015).

Approximately 50 % of children with FC have abnormal defecation dynamics

Reinforcing stimuli and aims to achieve a recognizable sensation with an appropriate response

long-term goal is to teach children to recognize the sensation by themselves

current evidence does not support the use of biofeedback training for the treatment of childhood constipation

Pelvic physiotherapy

- Pelvic physiotherapy + standard care vs. standard care
- multicenter randomized controlled trial of 53 children
- 92.3% success rate with PPT vs. 63.0% with standard care

CLINICAL—ALIMENTARY TRACT

Effectiveness of Pelvic Physiotherapy in Children With Functional Constipation Compared With Standard Medical Care



Marieke L. van Engelenburg-van Lonkhuyzen,¹ Esther M. J. Bols,¹ Marc A. Benninga,² Wim A. Verwijs,³ and Rob A. de Bie¹

Intervention	Therapeutic process (EPI and SPI) per planned session ^c		
1	EPI	Focus: information	Information and demystification Normalize behavior Improve TR Advice on PEG, MDD, and diet
	SPI	Focus: start TT, posture	Core stability and balance training Relaxation and breathing exercises PEG, MDD, TR/TT
2	EPI	Focus: information	Core stability and balance training Relaxation and breathing exercises Sensory processing techniques PFMT ^d
	SPI	Focus: TT, posture, body awareness (urge to defecate), straining to defecate	PEG, MDD, TR/TT
3–5	EPI	Focus: information	Core stability and balance training Relaxation and breathing exercises Sensory processing techniques PFMT ^d
	SPI	Focus: TT, posture, body awareness, straining to defecate, relaxation, and breathing	PEG, MDD, TR/TT
6	EPI	Focus: information	Core stability and balance Relaxation and breathing
	SPI	Focus: TT, posture, straining to defecate, relaxation, and breathing	PEG, MDD, TR

Prognosis

Functional constipation in children: a systematic review on prognosis and predictive factors

M A M Pijpers ¹, M E J Bongers, M A Benninga, M Y Berger

- 14 studies with a total of 1752 children
- 50% resolved and taken off laxatives after 6–12 months
- additional 10% were symptom free but still on laxatives
- recovery rate of 58% and 56% after 1–2 years and 5–10 years
- *“.. a sizable group remains symptomatic regardless of treatment and can remain symptomatic into adolescence or adulthood”*

Referrals / consultations

Red flags

Refractory constipation

Need for frequent cleanouts

Prolonged use of stimulants

Recurrent relapse after weaning off

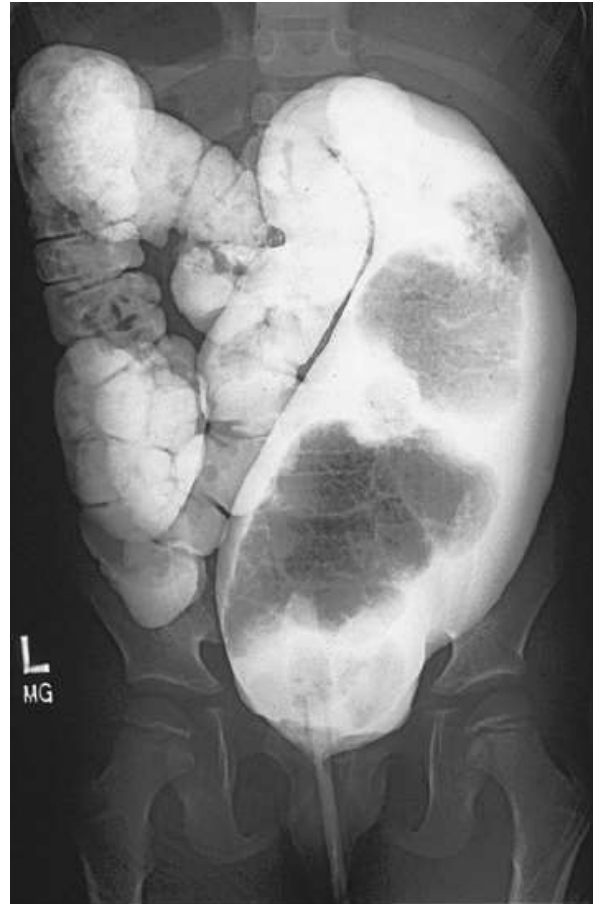


Conclusions

- Diagnosis is based on the Rome IV criteria after a thorough H&P
- Withholding behavior plays a major role
- Additional testing when an organic cause is suspected or if there is a lack of response
- Education, demystification, lifestyle advice, and toilet training (for age ≥ 4 years)
- Pharmacological treatment: disimpaction and long-term maintenance
- Polyethylene glycol (PEG) is the first choice
- Long-term stimulants can be used as alternative or additional options
- A large proportion of children remains symptomatic after 6–12 months

Contrast enema

- Look for megacolon, megarectum,
- Look for transition zone suspicious for Hirschsprung's disease



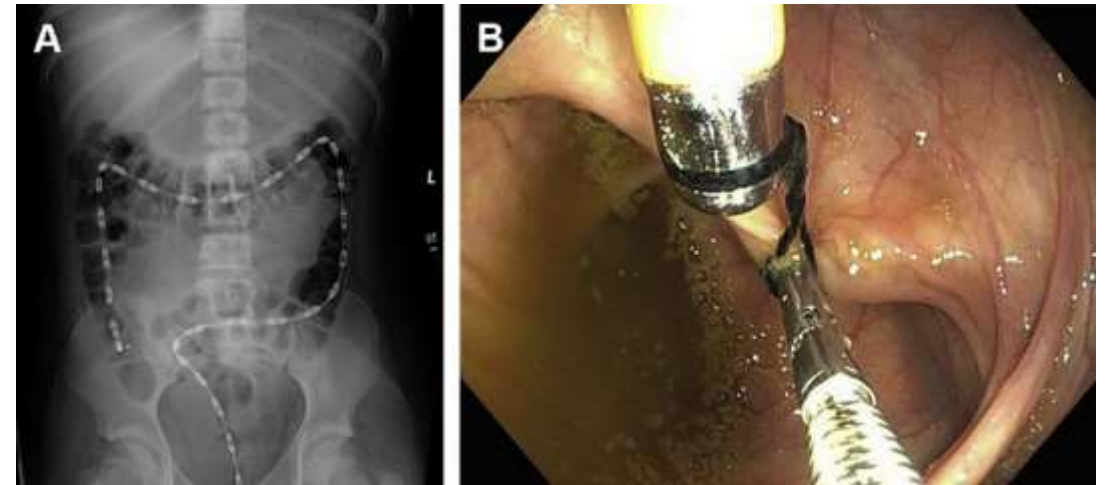
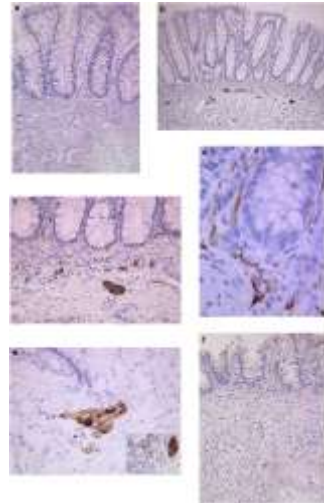
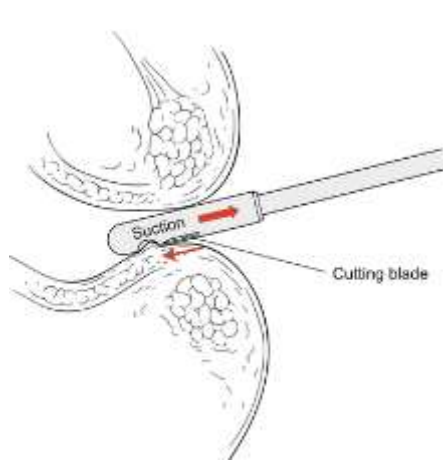
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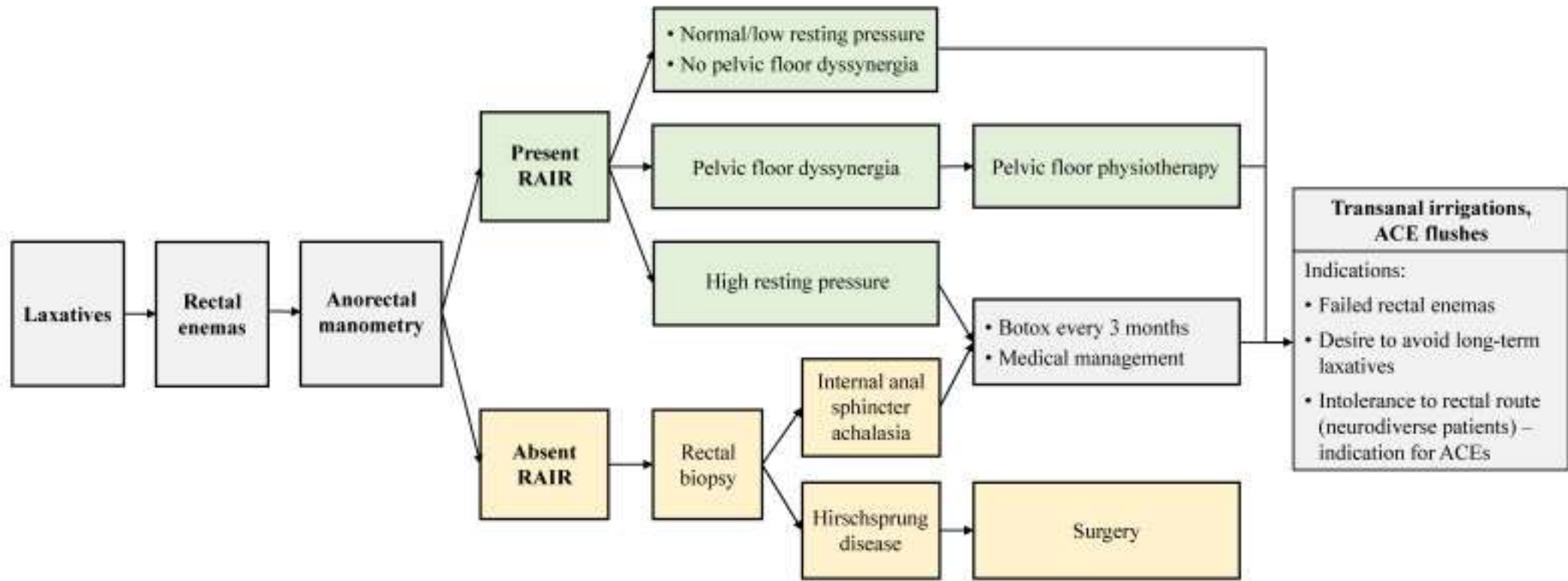


Peña A, Levitt M. 2002

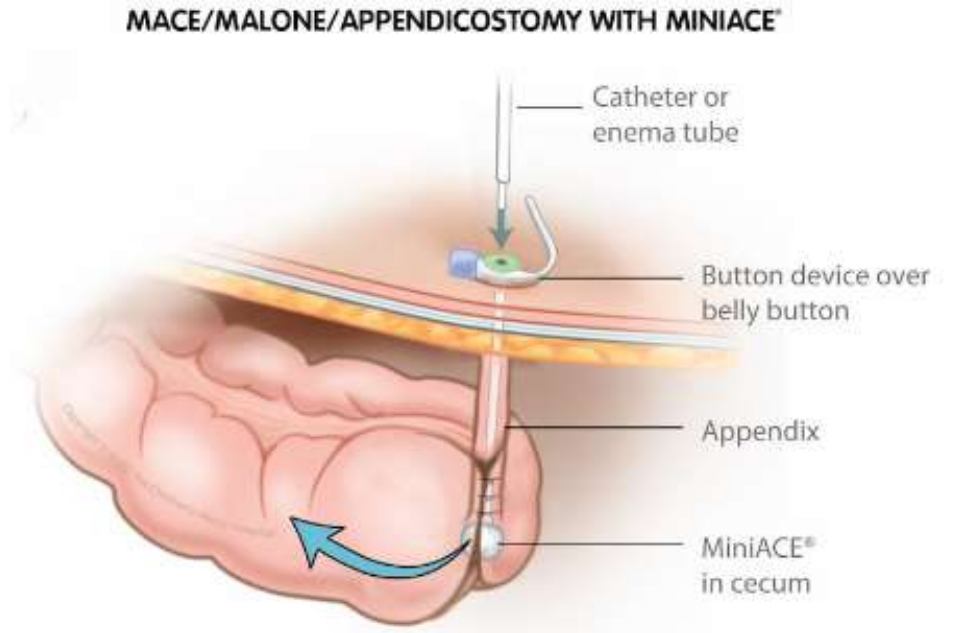
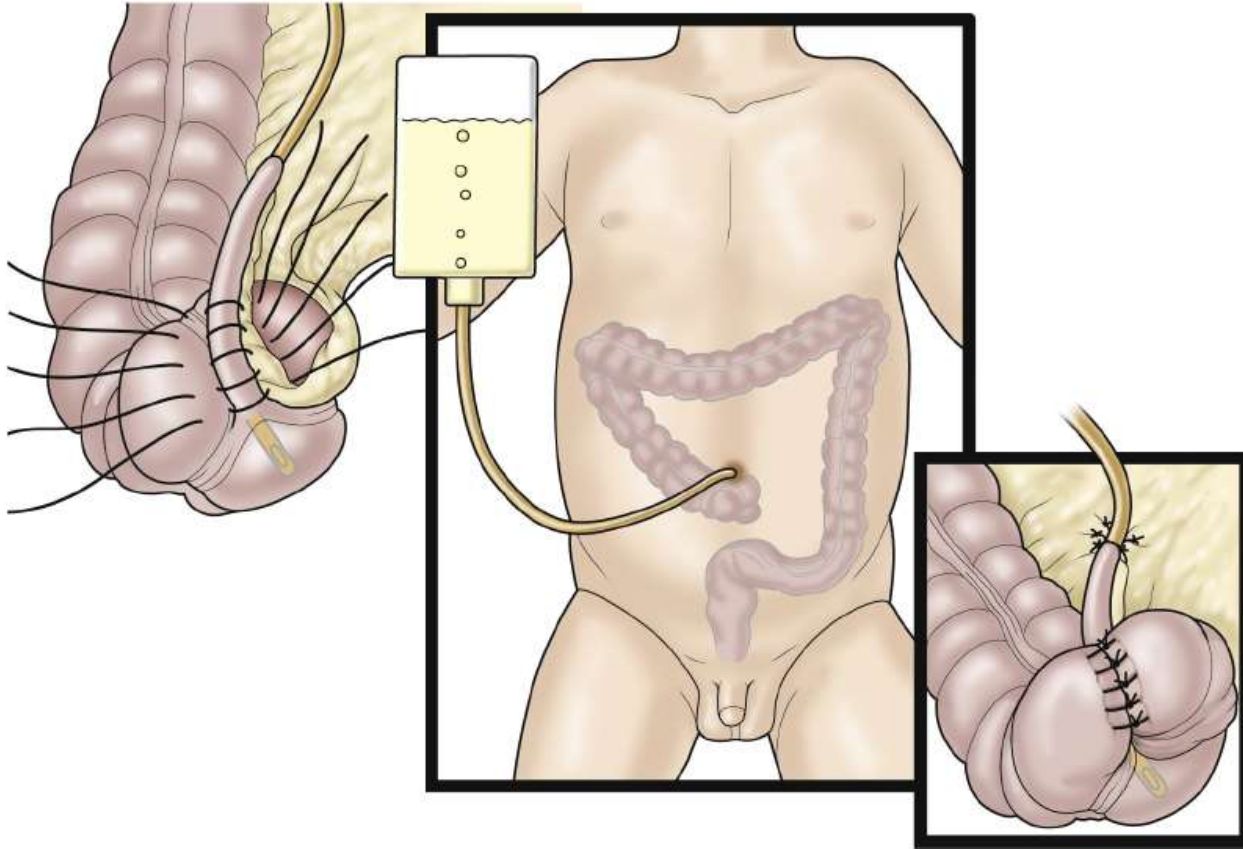
More advanced testing

- Anorectal manometry
- Colonic manometry
- Rectal suction biopsy

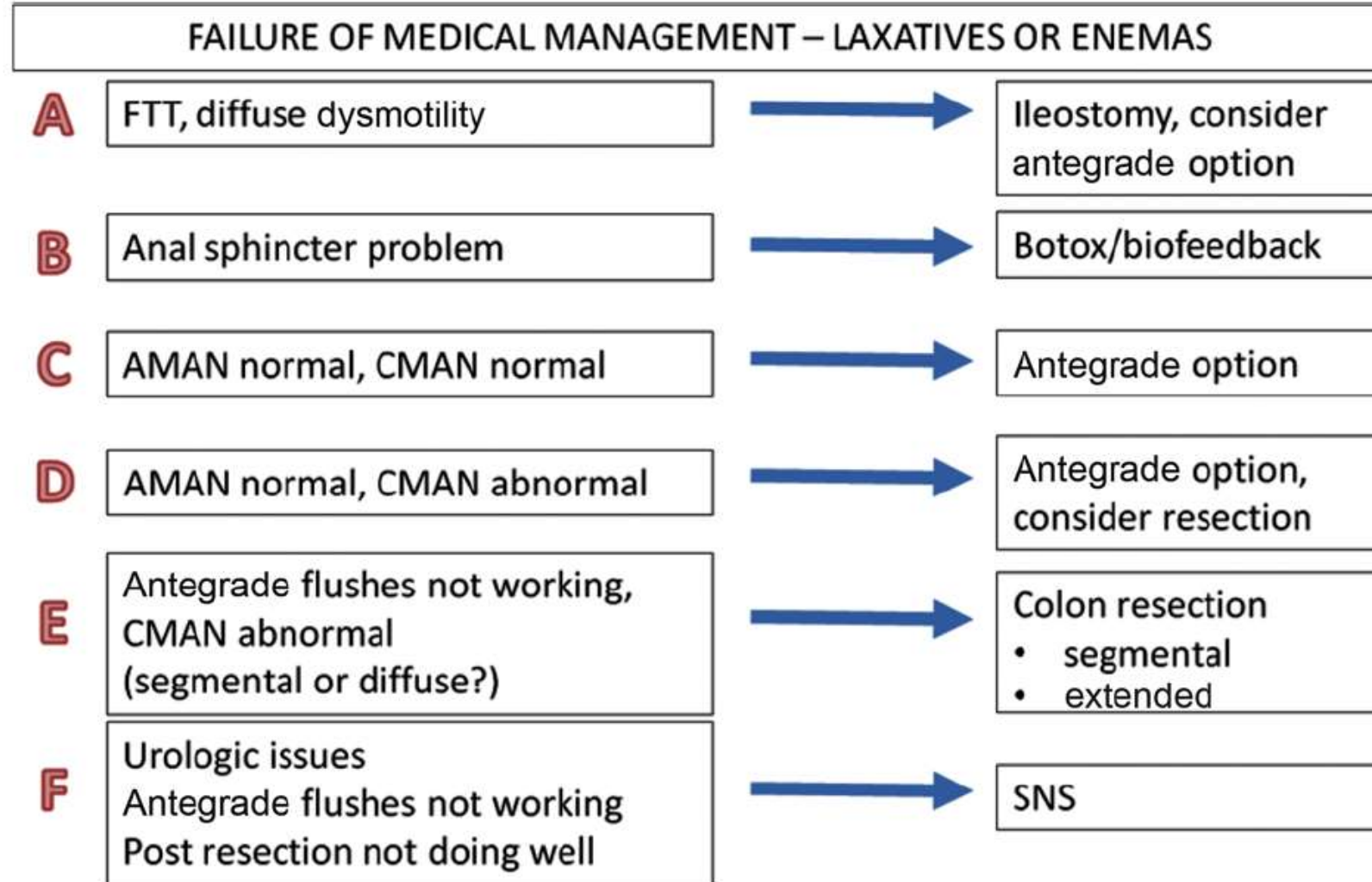




Antegrade enemas



Summary of surgical options



Anorectal manometry

- assesses anal sphincter function, rectal sensation, anorectal reflexes, and pelvic floor function
- balloon inflation with air and determine the presence or absence of the recto-anal inhibitory reflex (RAIR)
- In awake and cooperative patient - patient is asked to simulate defecation and push out an inflated balloon from the rectum

Colonic Manometry

- Determine if severe constipation that is unresponsive to adequate medical therapy is due to intrinsic colonic dysmotility or has functional etiology.
- Act as a guide to plan surgical interventions—including creation of diverting stoma, segmental colonic resection or formation of a conduit for administration of antegrade continence enemas.
- Evaluate a diverted colon before possible takedown of an ostomy